

Business Case for Building a CNG Infrastructure

Clean Cities Conference

Oklahoma City
May 12 - 15, 2002

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How to Build 20,000 Stations Economically in 10 Years

- 1,200 CNG Stations
- 110,000 Vehicles

Reduce cost by
46 cents per gallon



- 20,000 CNG Stations
- 1,350,000 Vehicles

Today's U.S. Fueling Infrastructure

	Stations	Vehicles
Gasoline Today	180,000	221,000,000
CNG Today	1,200	110,000

How Many Stations Are Needed to Make a Viable Infrastructure?

- Diesel studies show infrastructure required for acceptance as a viable fuel, is from 10% to 20% of gasoline infrastructure
- Dedicated AFV studies show same 10% to 20% requirement
- Therefore minimum of 20,000 CNG stations required for a viable fueling infrastructure

Tomorrow's U.S. Fueling Infrastructure

	Stations	Vehicles
Gasoline Today	180,000	221,000,000
CNG Today	1,200	110,000
CNG Tomorrow*	20,000	1,350,000

* 6,900 large stations with 156 vehicles per station
13,100 mini fast-fill stations with 22 vehicles per station

Today's Targeted NGV Customers

- Heavy fuel usage users
 - ✍ Public transit
 - ✍ State
 - ✍ Taxi cabs
 - ✍ Airport shuttle vans
 - ✍ Delivery vans (UPS etc.)
 - ✍ Refuse haulers
- Resulting in 110,000 NGVs

Present CNG Infrastructure

- High capacity fast-fill private/public stations resulting in 1,200 stations (\$200K and up)
- Light to medium capacity private stations (\$10K to \$200K)
 - ✍ Fast-fill
 - ✍ Time-fill
 - ✍ Combination time-fill/fast-fill

The Plan: 20,000 Stations & 1,350,000 NGVs

Who will the customers be?

- Heavy fuel consumption users
 - ✍ Public transit
 - ✍ State
 - ✍ Taxi cabs
 - ✍ Airport shuttle vans
 - ✍ Delivery vans (UPS etc.)
 - ✍ Refuse haulers
- Light to medium fuel consumption users
 - ✍ State fleets
 - ✍ Municipalities
 - ✍ School buses
 - ✍ Private fleets
- Consumers
 - ✍ Commuters
 - ✍ Second vehicle households

CNG Infrastructure Required

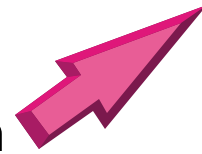
- High capacity fast-fill private/public stations (\$200K and up)
- Mini fast-fill public stations (\$80K to \$200K)
- Light to medium capacity private stations where required (\$10K to \$200K)
 - ✍ Fast-fill
 - ✍ Time-fill
 - ✍ Combination time-fill/fast-fill
- Residential (\$999)

Cost Comparison of Large & Small Station Infrastructure Options

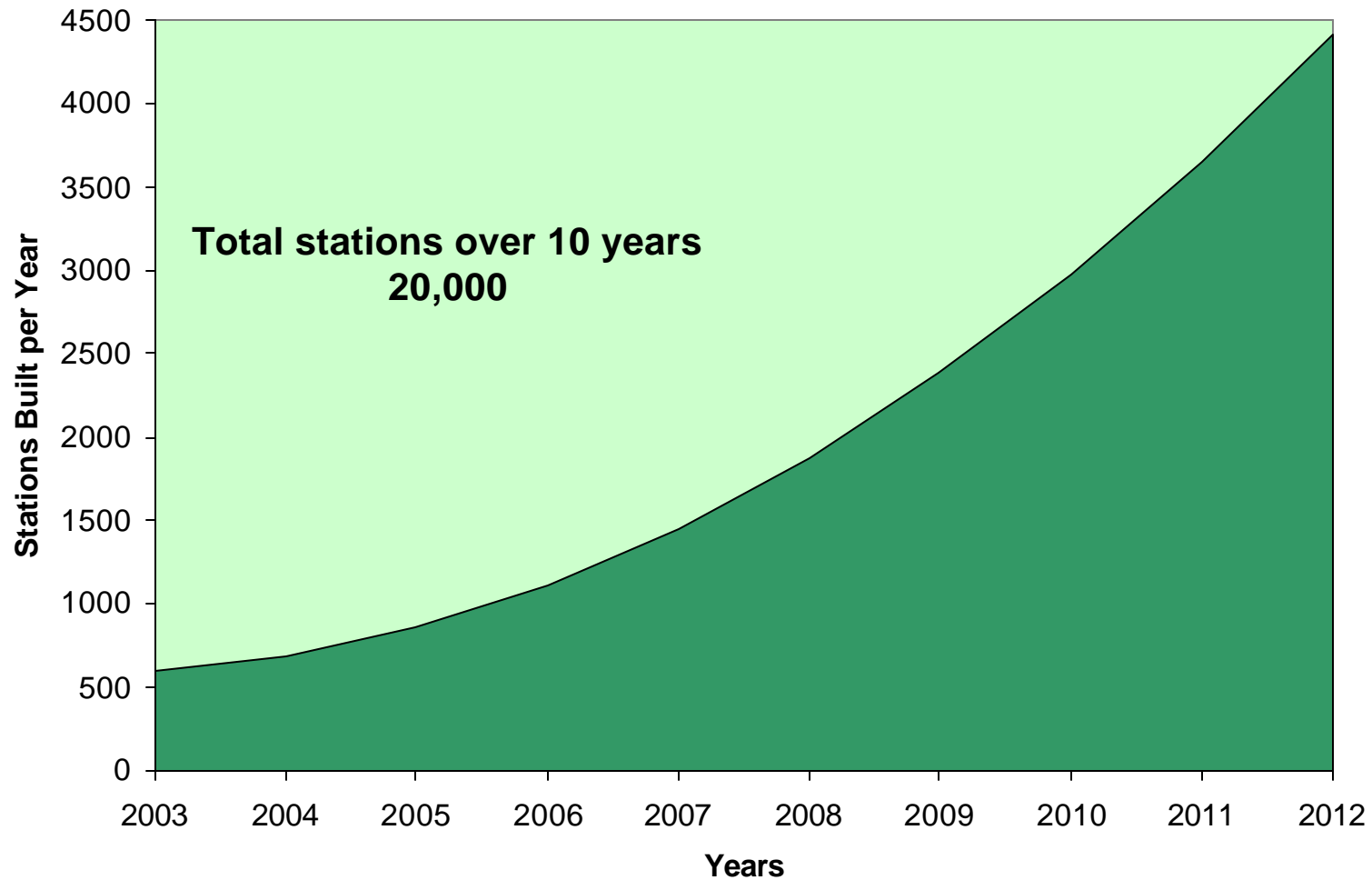
(Assumes no Subsidies)

	Large Station Design Target	Today's Station Actual Operation	Mini Fast-Fill Station	Building Large Stations at Mini Fast-Fill Volumes	Building Infrastructure with Large/Mini Combination
Number of stations		1,200			20,000
Number of vehicles		110,000			1,350,000
Vehicles per station	156	92	22	22	68
GGEs per vehicle per day	5.0	2.9	5.0	5.0	5.0
GGEs per day per station	780	267	110	110	340
GGEs per year	243,360	100,000,000	34,320	34,320	2,121,600,000
Capital & Maintenance	\$ 0.353	\$ 0.878	\$ 0.744	\$ 2.017	\$ 0.435
Gas, Electricity, Ohd's, Margins	\$ 1.021	\$ 1.021	\$ 0.966	\$ 1.021	\$ 1.009
Total cost per GGE	\$ 1.37	\$ 1.90	\$ 1.71	\$ 3.04	\$ 1.44

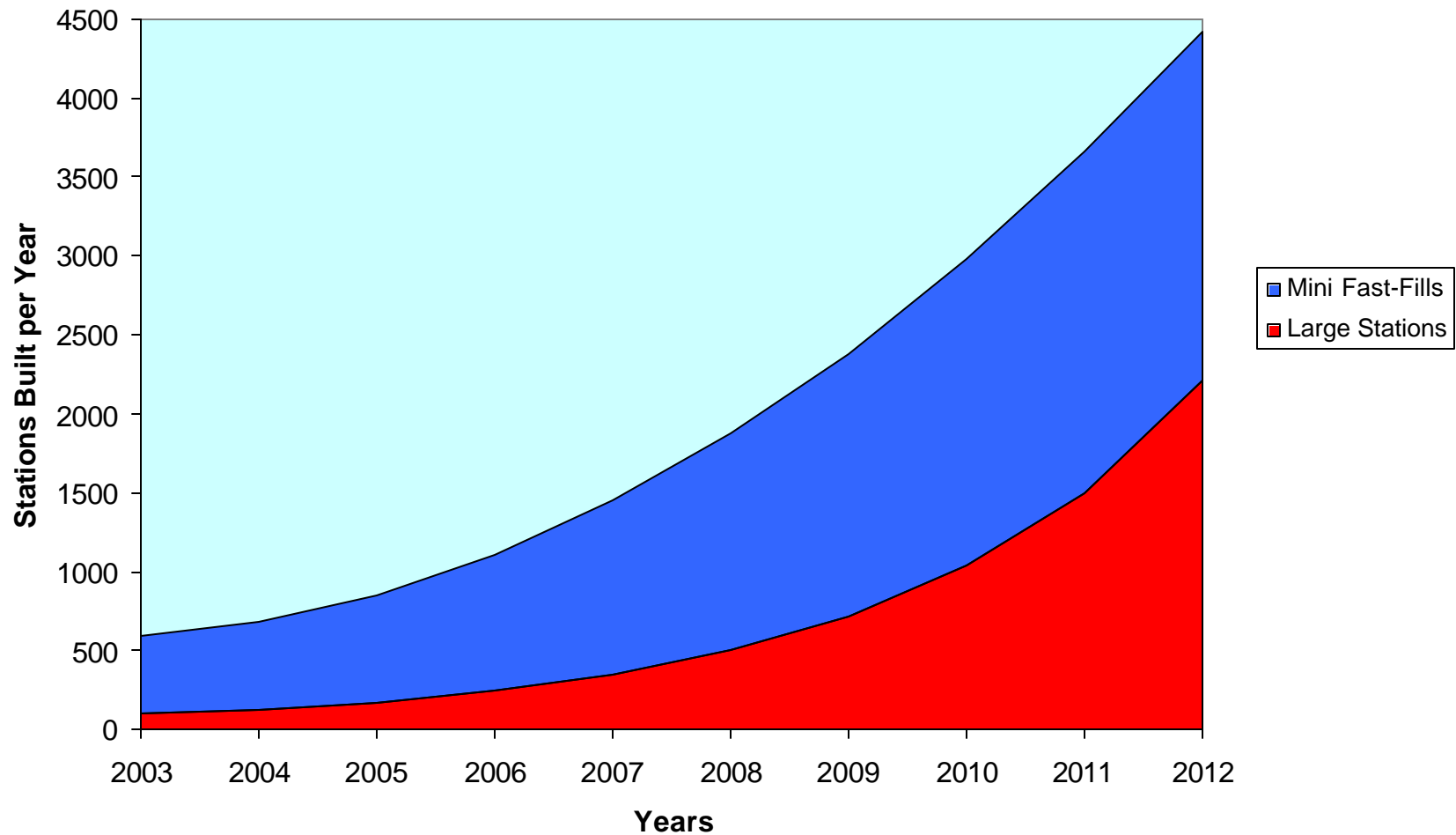
Cost reduction of 46 cents per gallon



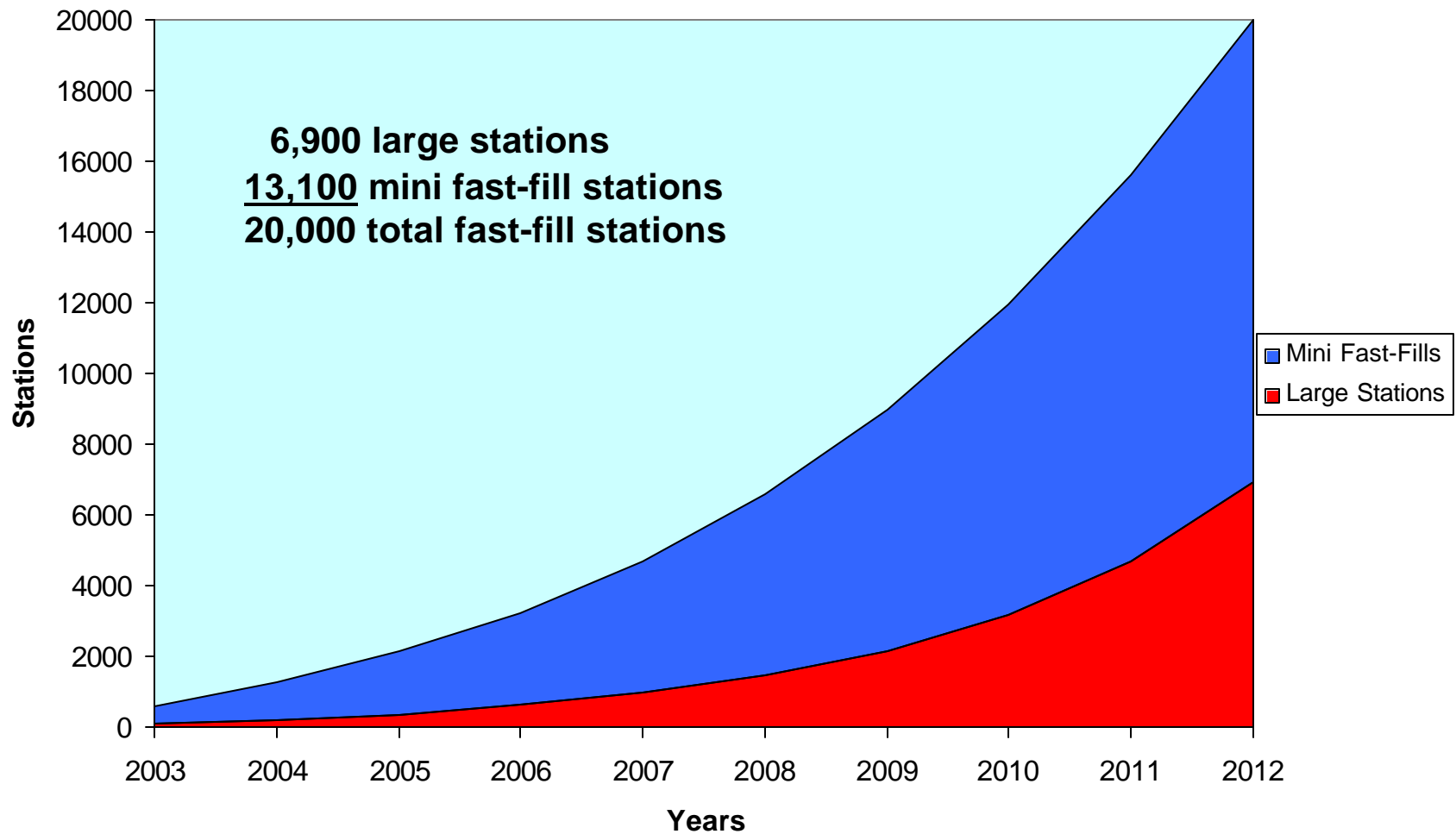
CNG Station Build Plan



CNG Station Mix by Year

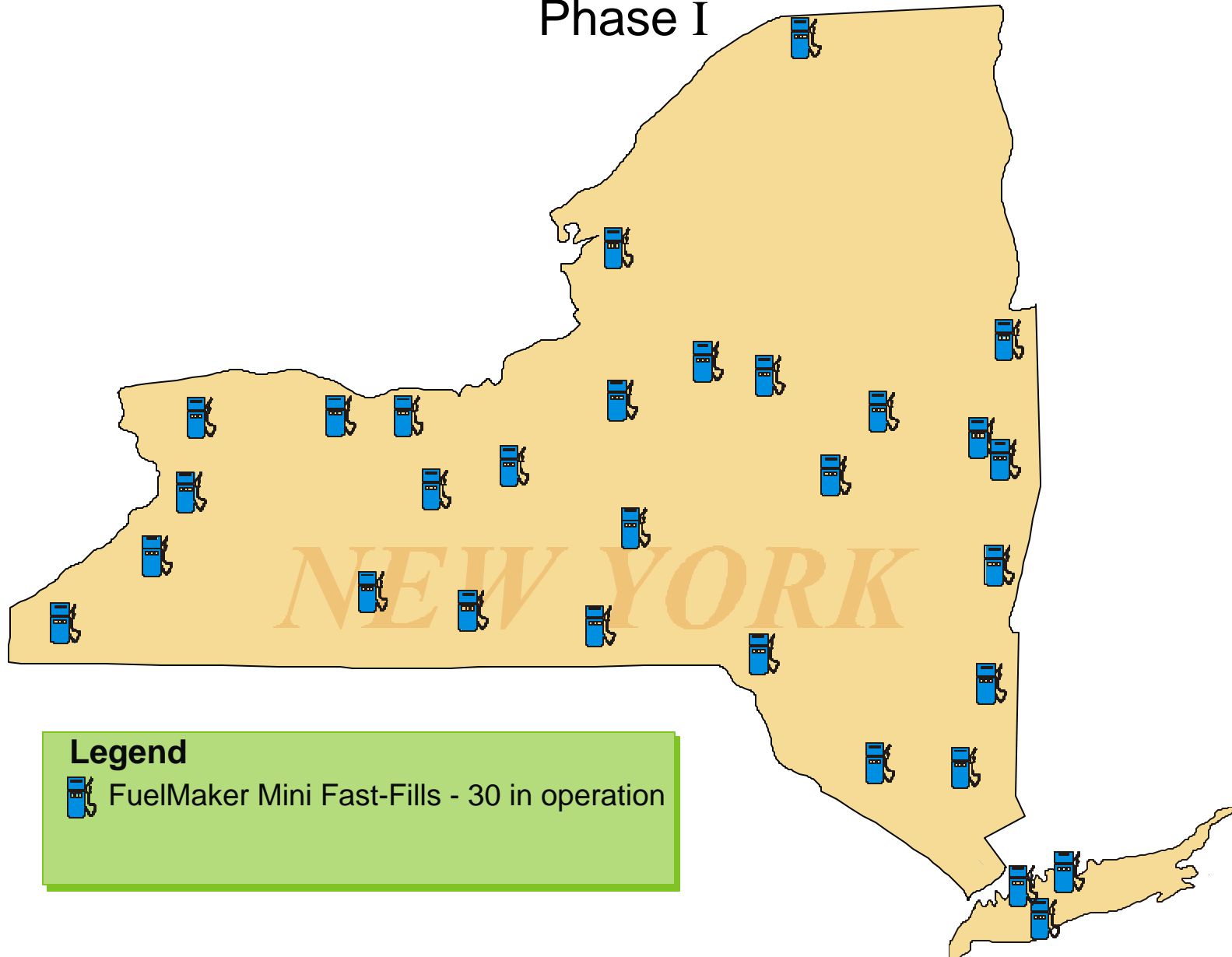


CNG Cumulative Station Mix



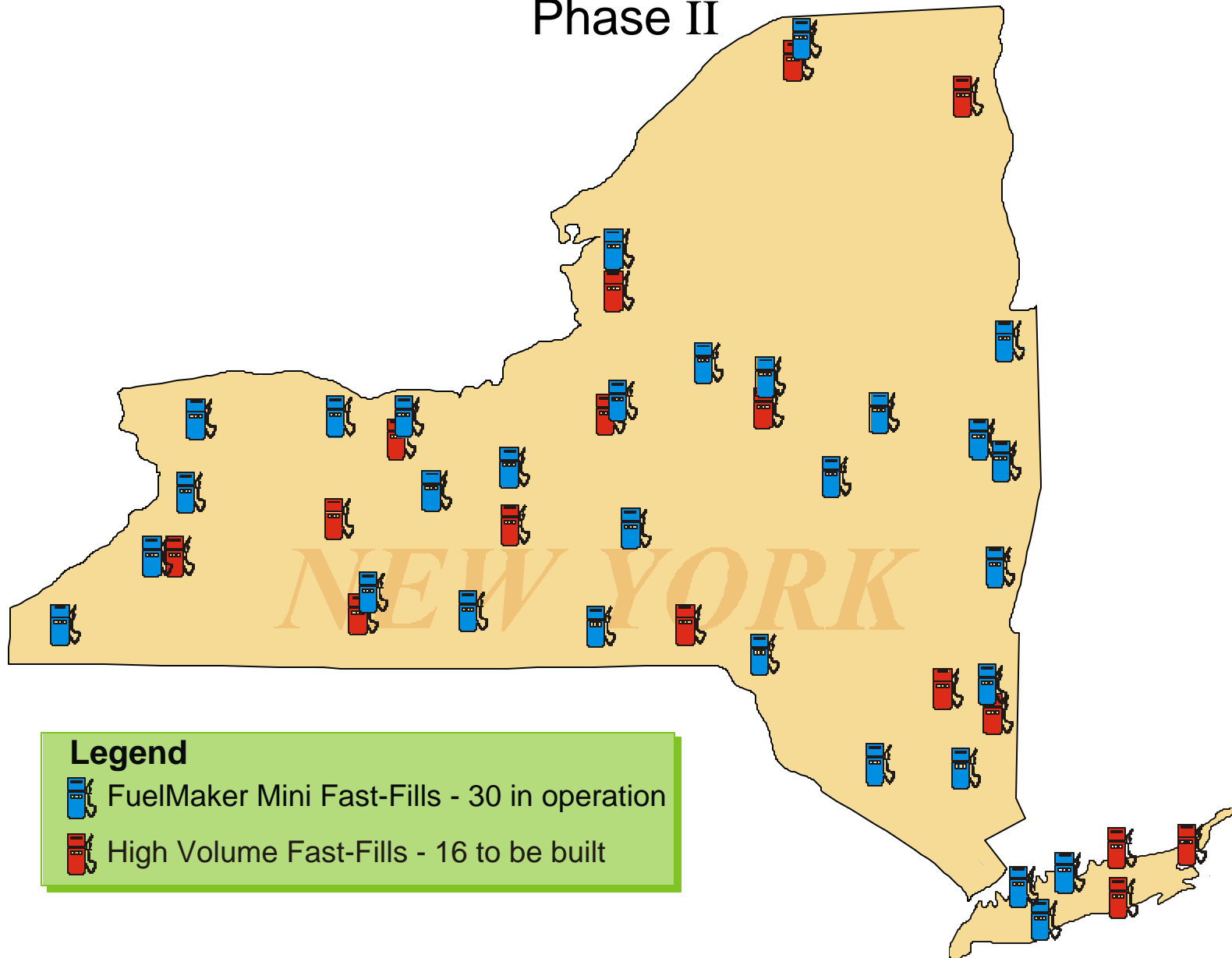
NY State Clean Fuel Vehicle Program

Phase I



NY State Clean Fuel Vehicle Program

Phase II



New York State DOT Mini Fast-Fills



FuelMaker Fleet Applications

Public Works - Fulton County, GA



Needed CNG Infrastructure

- High capacity fast-fill private/public stations (\$200K and up)
- Mini fast-fill private/public stations (\$80K to \$200K)
- Light to medium capacity private stations where required (\$10K to \$200K)
 - ✍ Fast-fill
 - ✍ Time-fill
 - ✍ Combination time-fill, fast-fill
- Residential (\$1,000)

American Honda - Torrance, CA

Private Fleet Fast-Fill



Port of L.A. - Los Angeles, CA

Combination Time-Fill/Fast-Fill



City of Walnut, CA

Combination Time-Fill/Fast-Fill



San Marcos Unified School District Combination Time-Fill/Fast-Fill



Monrovia Unified School District Time-Fill



Gas Utility - Hong Kong Small Time-Fill



American Honda - Torrance, CA Hydrogen Station



Needed CNG Infrastructure

- High capacity fast-fill private/public stations (\$200K to \$3000K)
- Mini fast-fill private/public stations (\$80K to \$200K)
- Light to medium capacity private stations (\$10K to \$200K)
 - ✍ Fast-fill
 - ✍ Time-fill
 - ✍ Combination time-fill/fast-fill
- Residential (\$999)

FuelMaker HRA

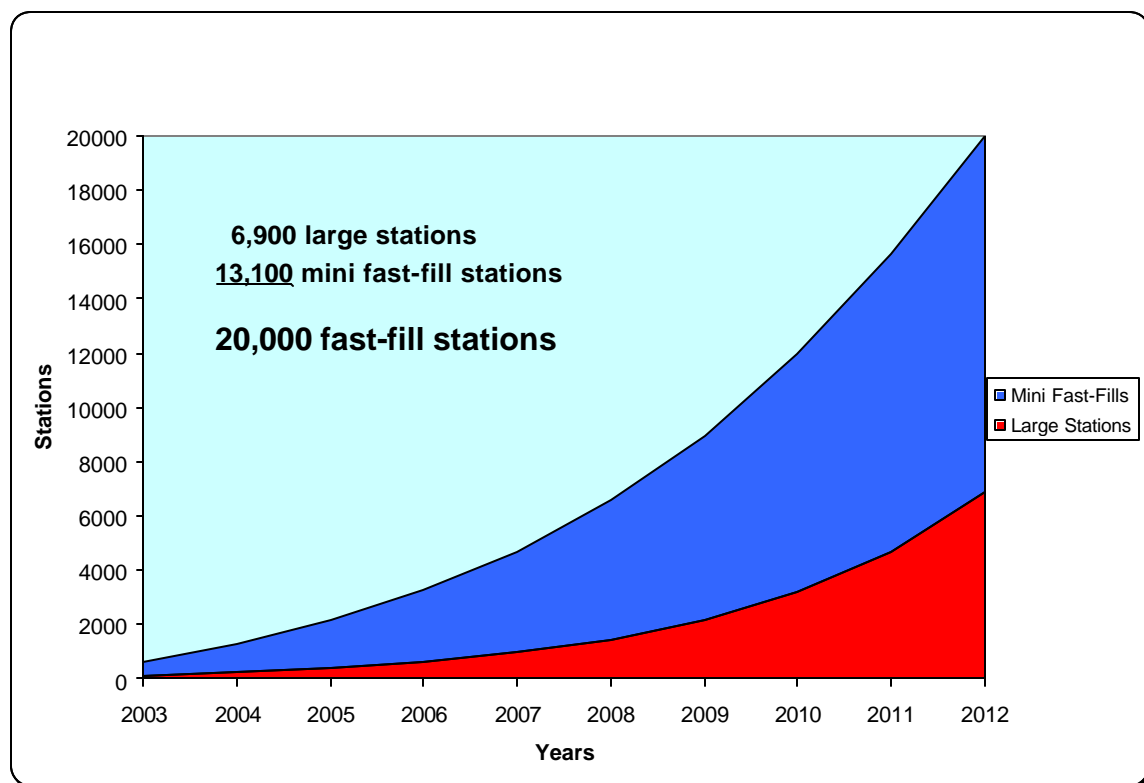
Product launch late 2003



FuelMaker Home Refueling



10 Year CNG Infrastructure Business Case



- 20,000 Public CNG stations
- 1,350,000 NGVs
- Effective national CNG infrastructure in place
- Cost reduction of 46 cents per gallon
- Private on-site stations where required
- Home Fueling to facilitate large consumer market